

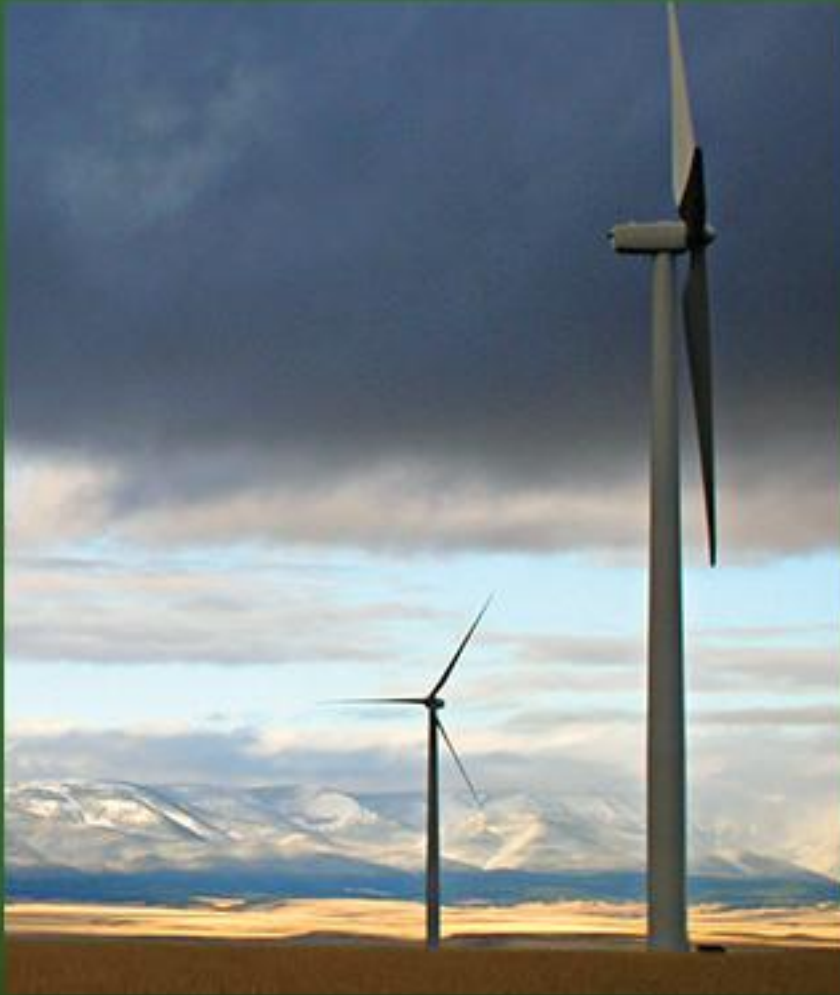
# MONTANA IS WIND COUNTRY

Roping the wind  
for today's power  
and tomorrow's  
energy solution



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# Montana is Wind Country

Wind energy :

- No GHG's
- Renewable
- Uses no water
- Technology is mature and cost competitive.

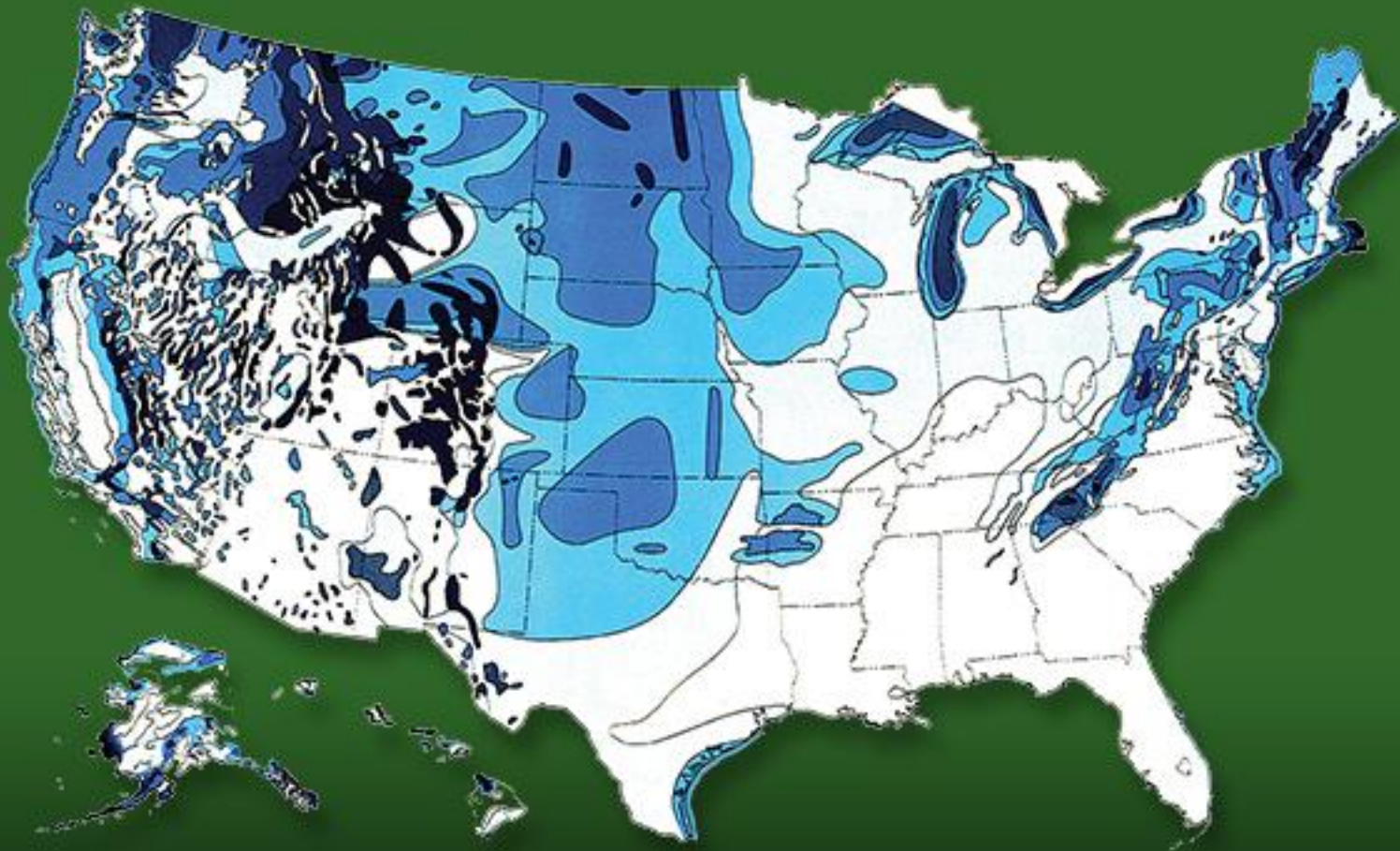
Much of Montana's wind has yet to be tapped and represents a great investment opportunity



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# National wind map



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# Montana wind energy objectives

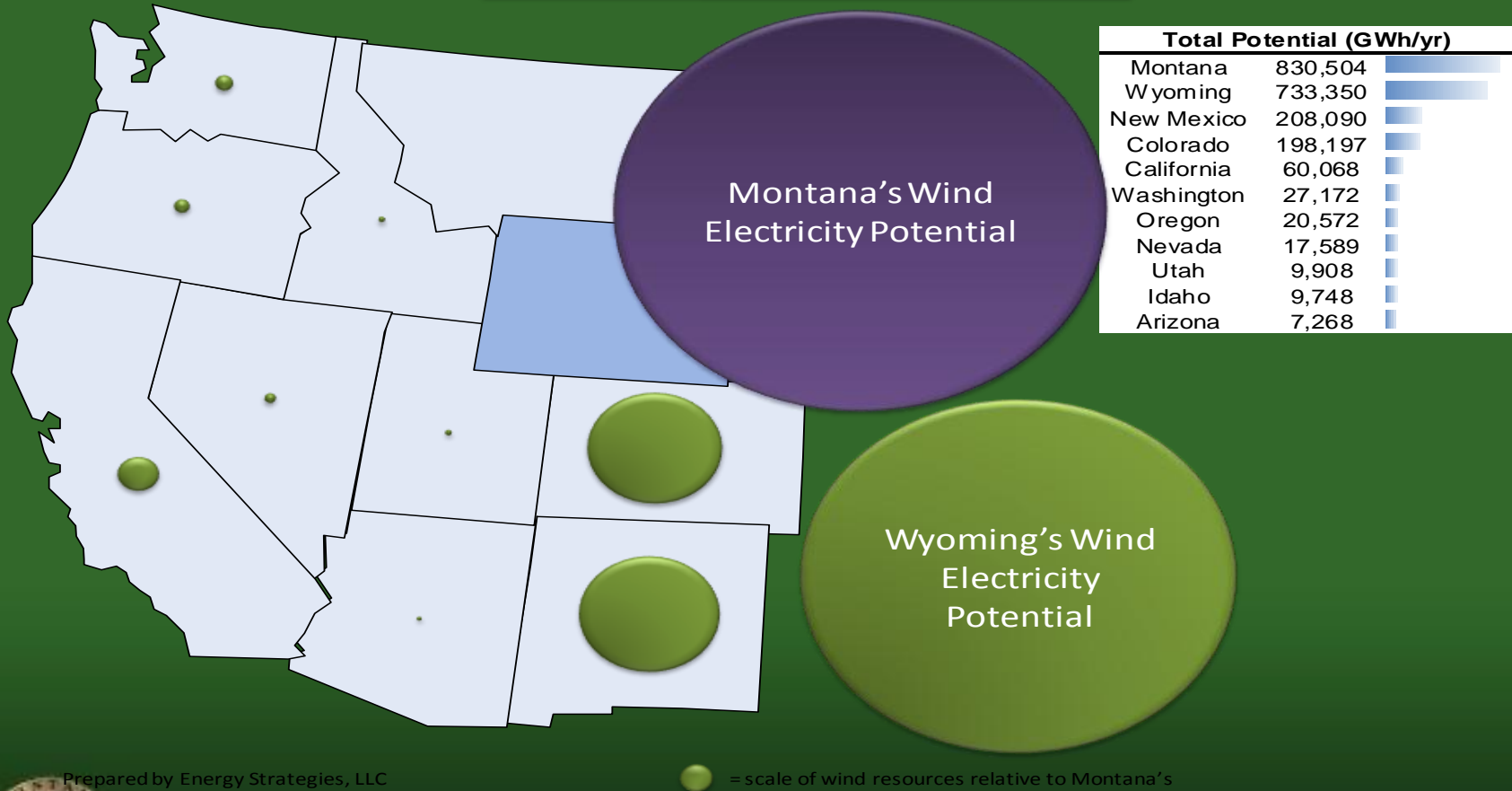
- Install 20,000 MW in Montana in the next 20 years, enough power to charge 12,000 million electric vehicles
- Montana's wind power potential alone could provide enough power to convert all of the vehicles in the U.S. to electric rather than fossil fuel burning.
- Complement Montana wind with innovative firming sources derived from low carbon methods including pumped hydro, Compressed Air Energy Storage, batteries, natural gas and coal employing Carbon Capture and Storage.





# Western States Wind Energy Potential

Wind Electricity Potential  
(GWh/yr) Class 4-7



Prepared by Energy Strategies, LLC



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# #1 State in Class 3 and above

## Wind Speed at 50 meters

m/s	mph
0 - 5.0	0 - 11.2
5.0 - 5.5	11.2 - 12.3
5.5 - 6.0	12.3 - 13.4
6.0 - 6.5	13.4 - 14.5
6.5 - 7.0	14.5 - 15.7
7.0 - 7.5	15.7 - 16.8
7.5 - 8.0	16.8 - 17.9
8.0 - 8.5	17.9 - 19.0
8.5 - 9.0	19.0 - 20.1
9.0 - 9.5	20.1 - 21.3
9.5 - 10.0	21.3 - 22.4
>10.0	>22.4

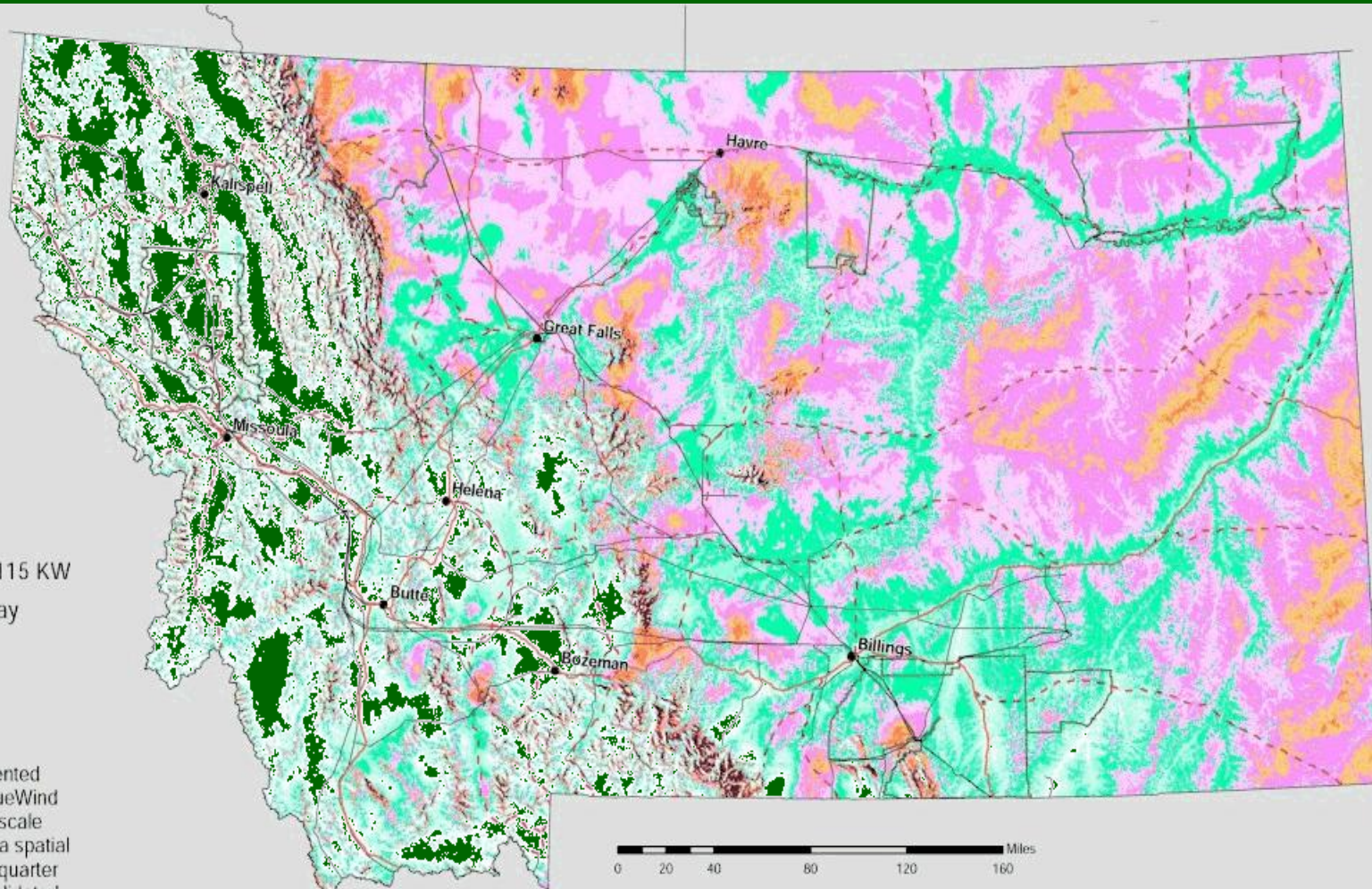
● Major Cities

— Transmission Lines > 115 KW

— Limited Access Highway

- - - Highway

▭ Tribal Reservations



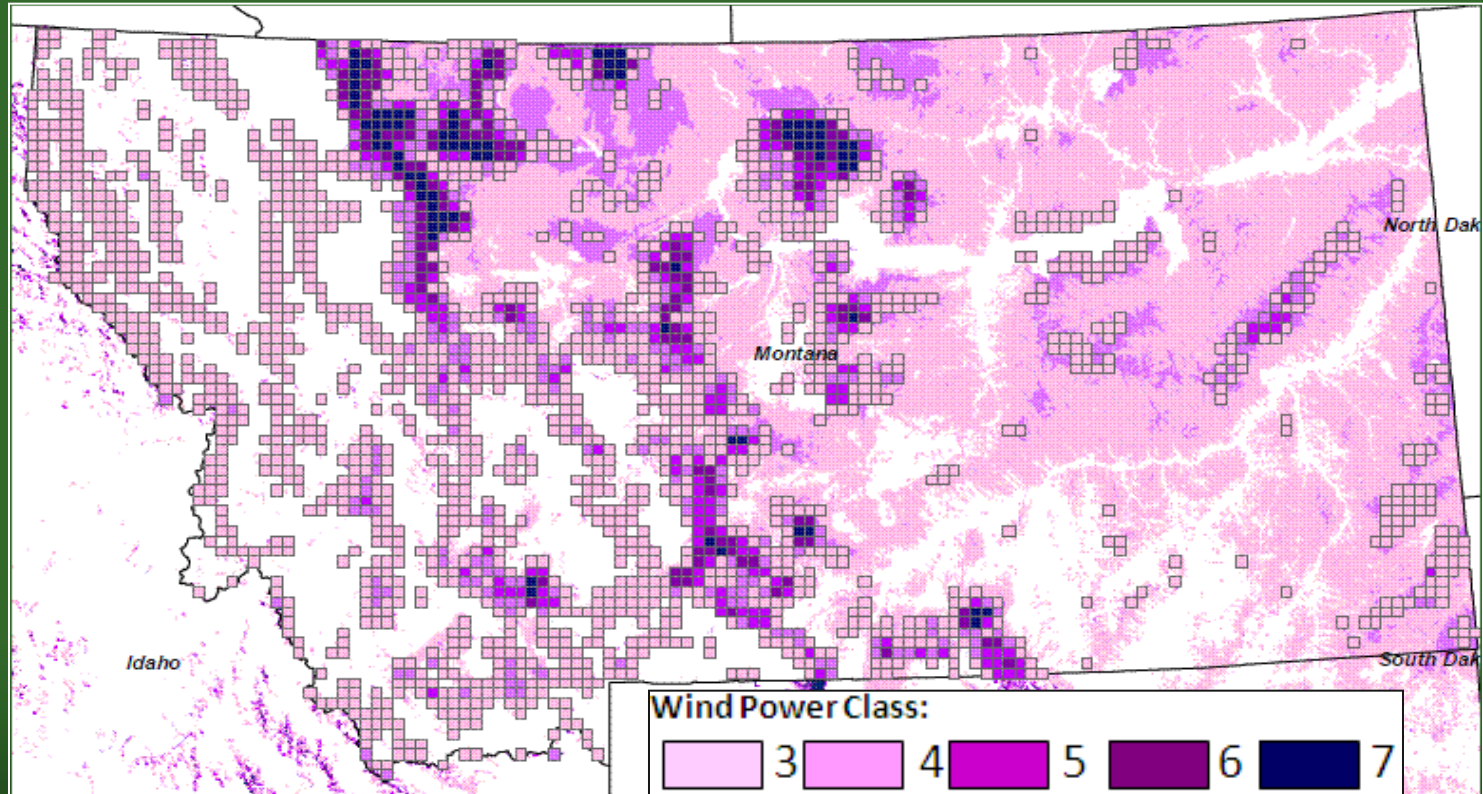
The wind resource estimates presented on this map were developed by TrueWind Solutions using MesoMap, a mesoscale atmospheric simulation system, at a spatial grid resolution of 400 meters (one-quarter mile). The estimates have been validated by the National Renewable Energy Laboratory (NREL) and independent

## Project Sponsors

NREL, the Bonneville Power Administration, Northwestern Energy, the Wyoming Business Council, enXco, the Northwest Power Planning Council, Zilkha Renewable Energy, Kinkitat County, EnerWind, ABR, Renewable Energy Systems (RESA)



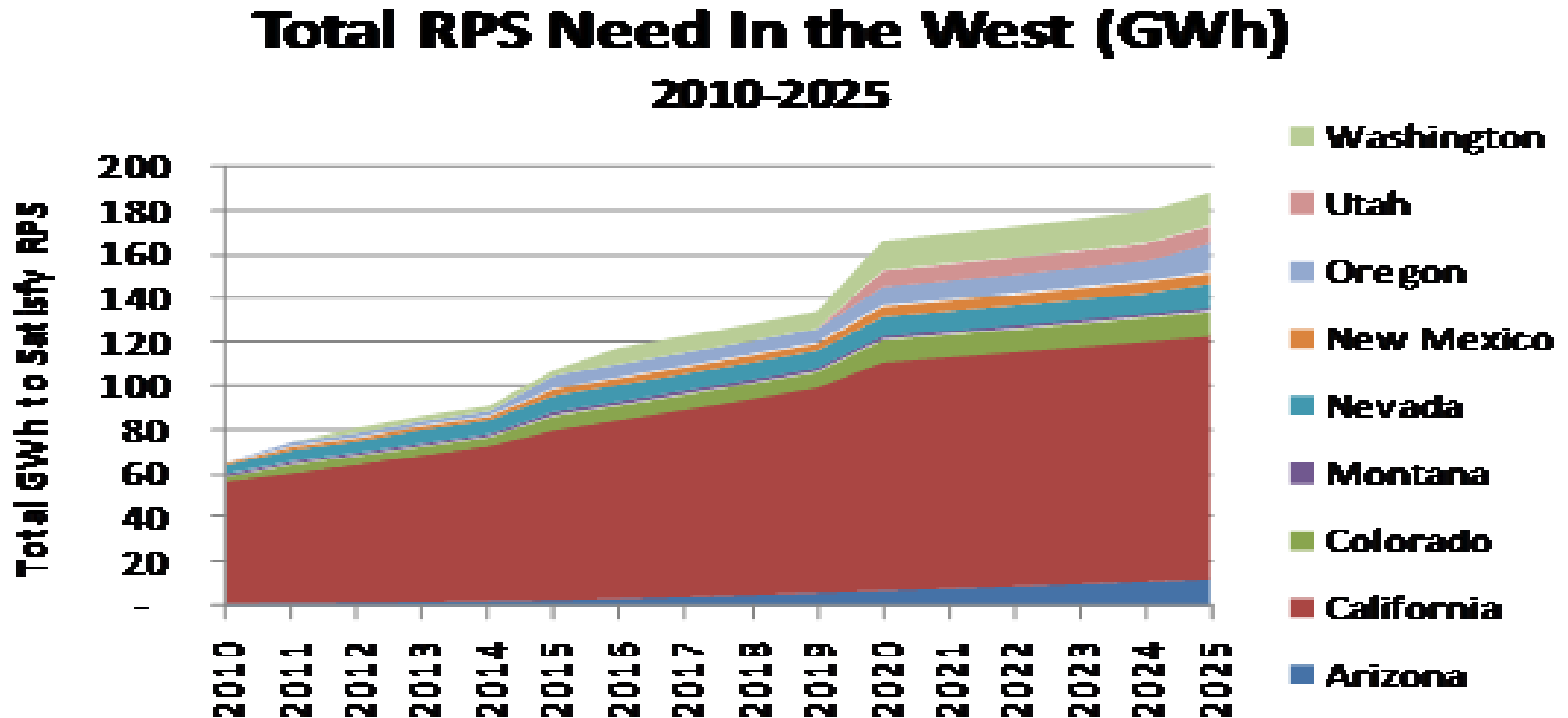
# Montana Has 15,624 MW of Class 6 and 7 Wind Power Potential



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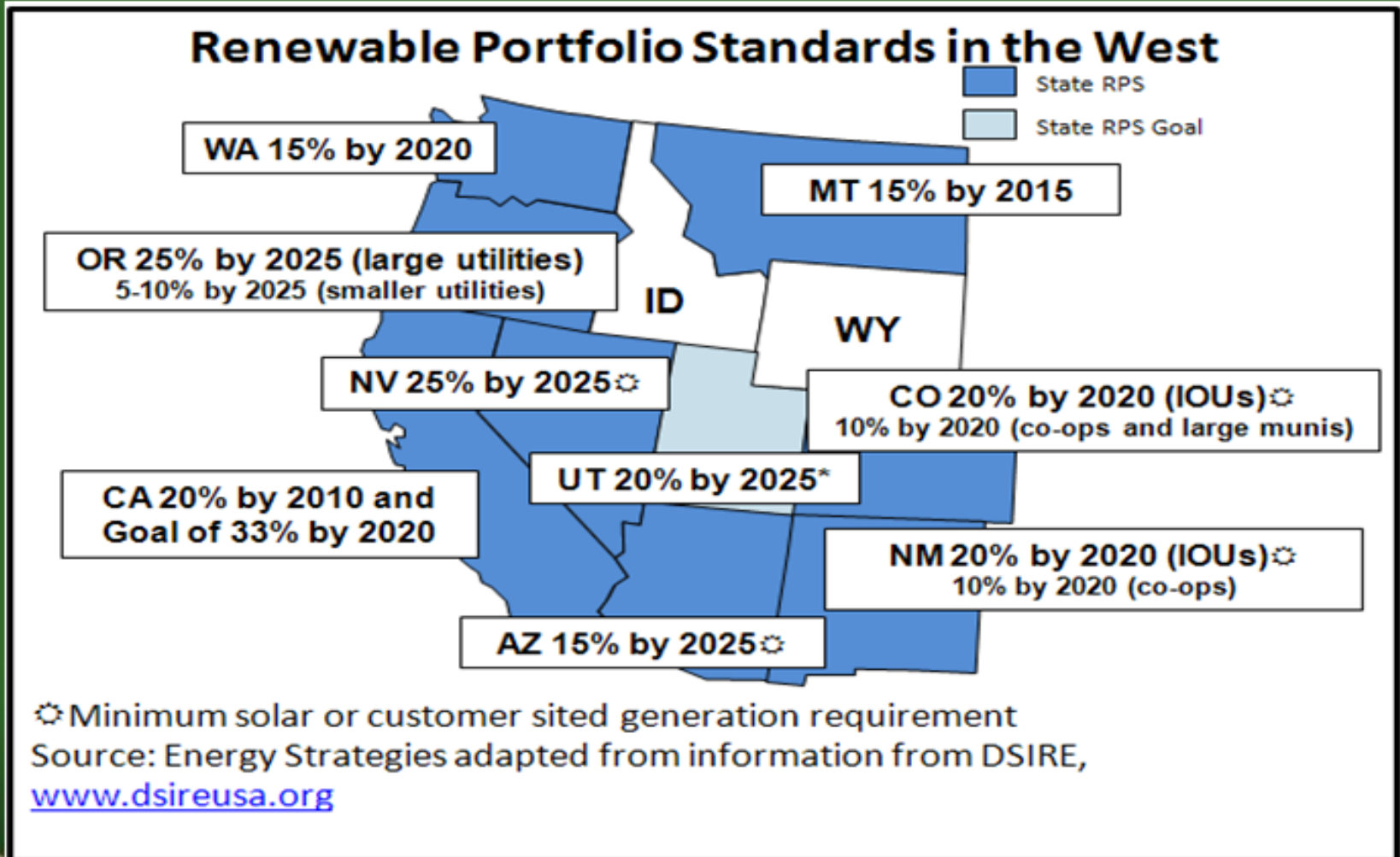
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# Total RPS Need in the West – 123,000 GWh by 2025 (Approx. 40,000 MW)

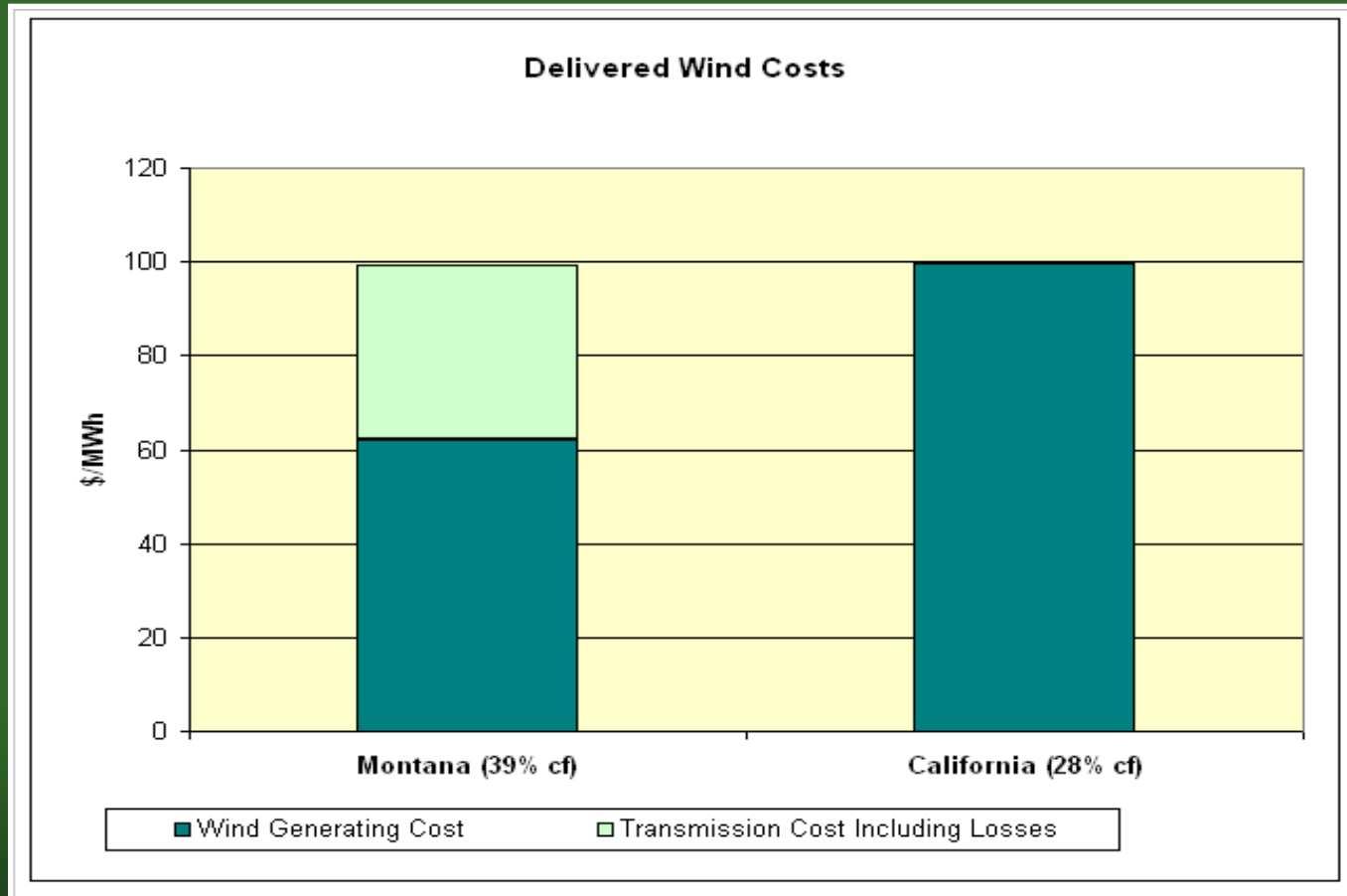




# Renewable Portfolio Standards in the West



# Wind From Montana is Competitive with Wind Produced in California



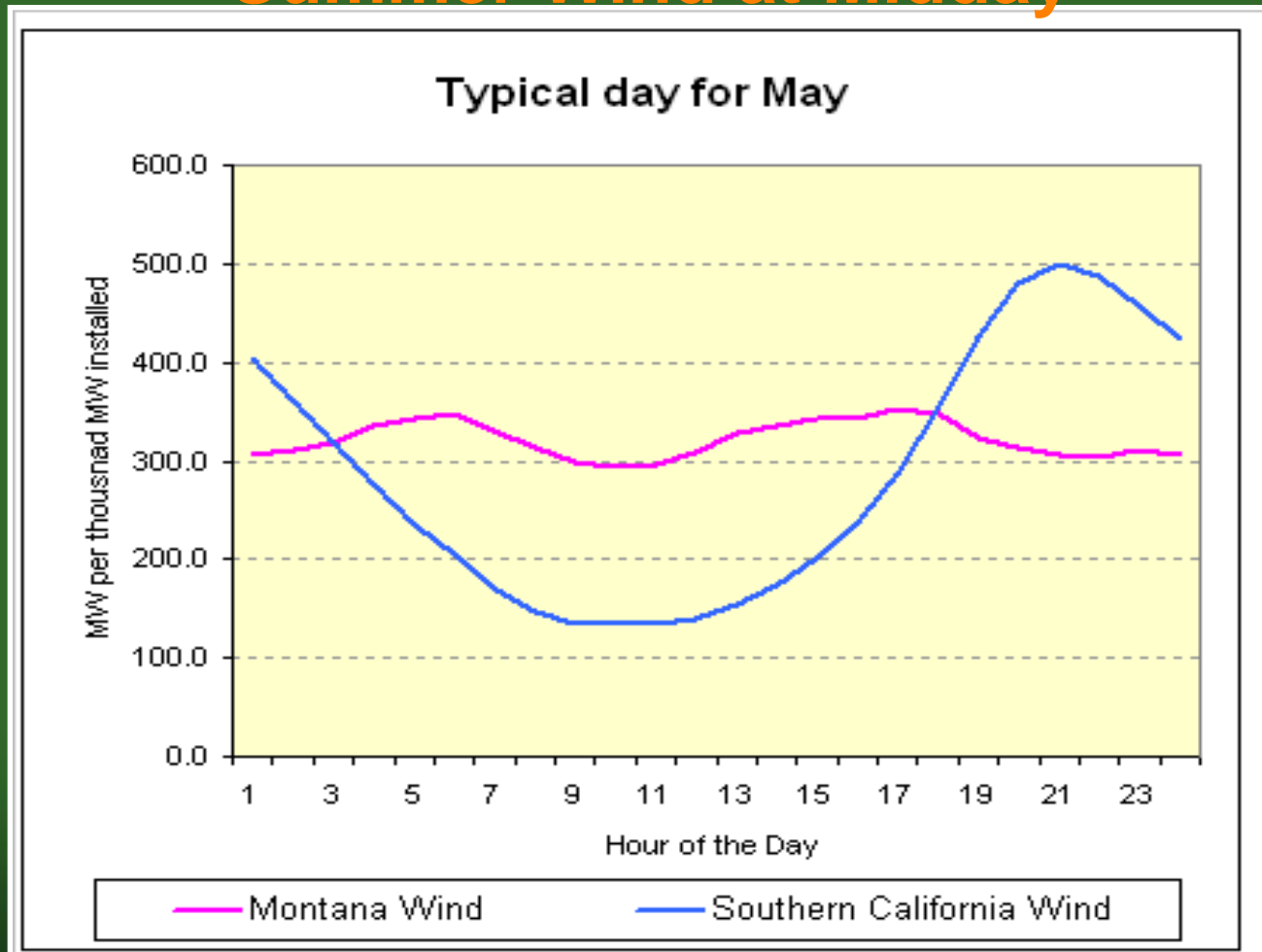
Montana wind capacity factor from selected sites from the NREL Western Winds Dataset California wind capacity factor corresponds to values in the WREZ transmission model for locations "CA\_WE" and "CA\_CT"



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# And Complements Southern California's Summer Wind at Midday



Values are derived from NREL's Western Winds Dataset



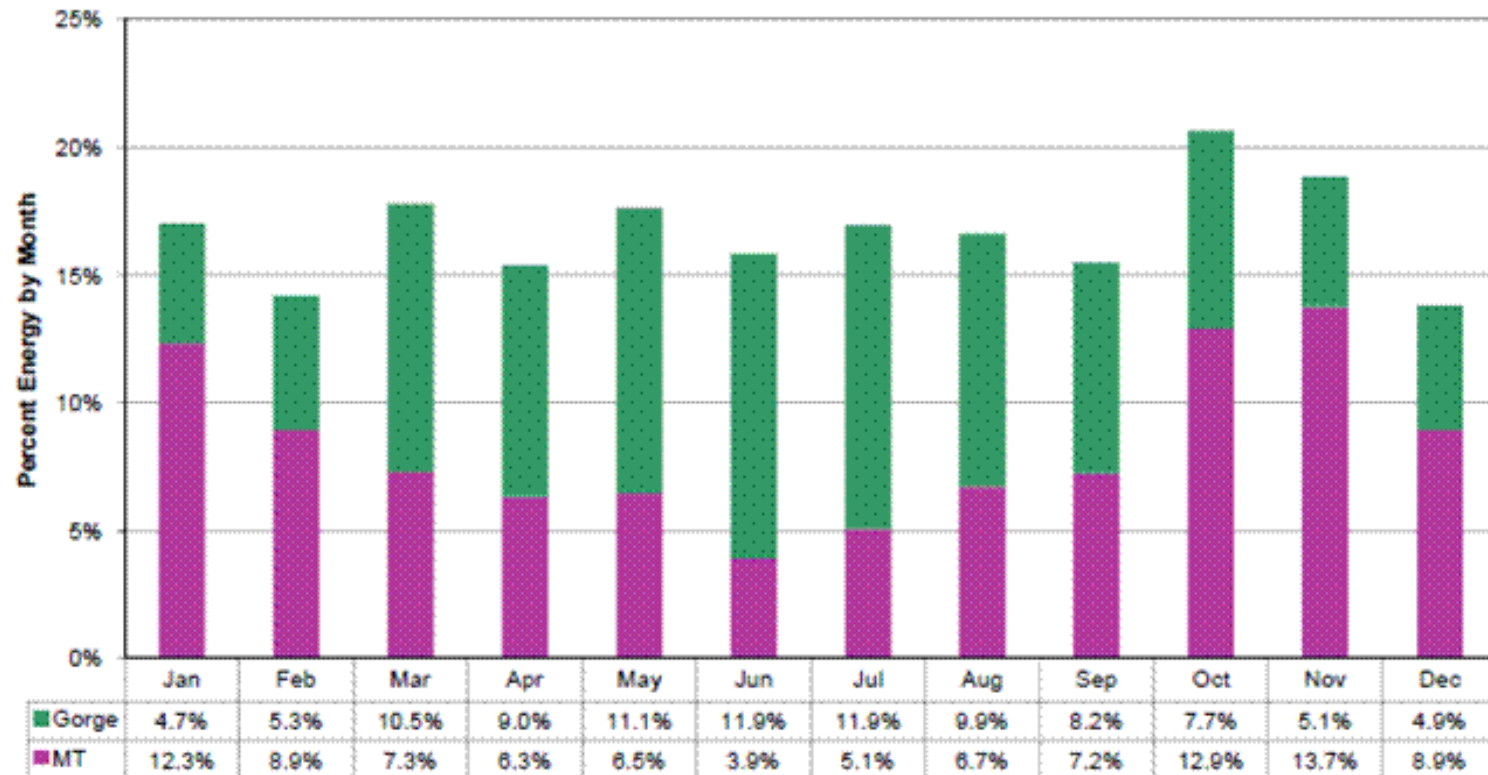
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# Wind Diversity Benefits

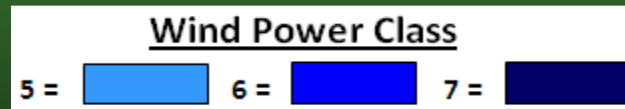
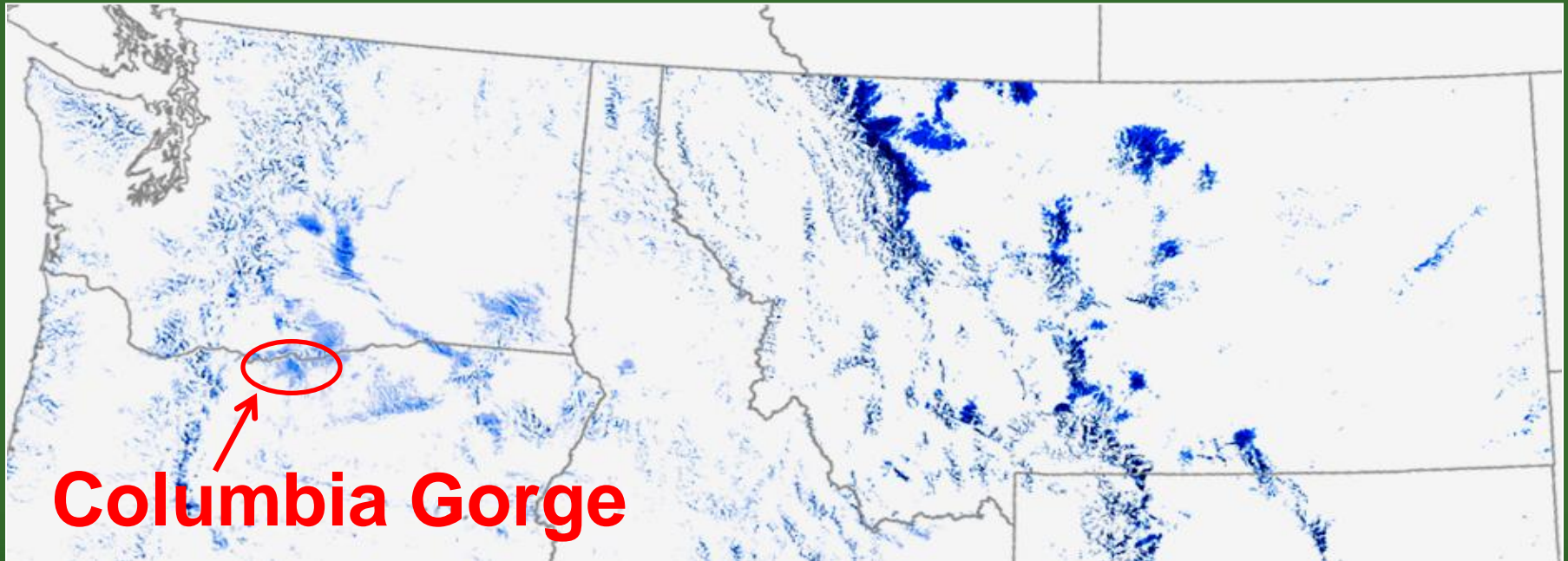
Montana and Columbia Gorge  
Generalized Monthly Wind Energy Distribution



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# Benefits of Geospatial Diversity – Montana / Columbia Gorge Wind



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# Montana wind projects

Montana has the fastest national growth rate for wind energy, going from 1 MW of installed capacity in 2005 to 376 today.

- Near term development could add up to an additional 700 MW
- 50 projects in various stages that could produce over 5,000 MW



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# Montana wind projects

Glacier Wind - Shelby  
Judith Gap - Harlow  
Diamond Willow - Baker  
Horseshoe Bend – Great Falls  
Rim Rock - Shelby  
Coyote Wind - Springdale  
Horizon Wind - Martinsdale

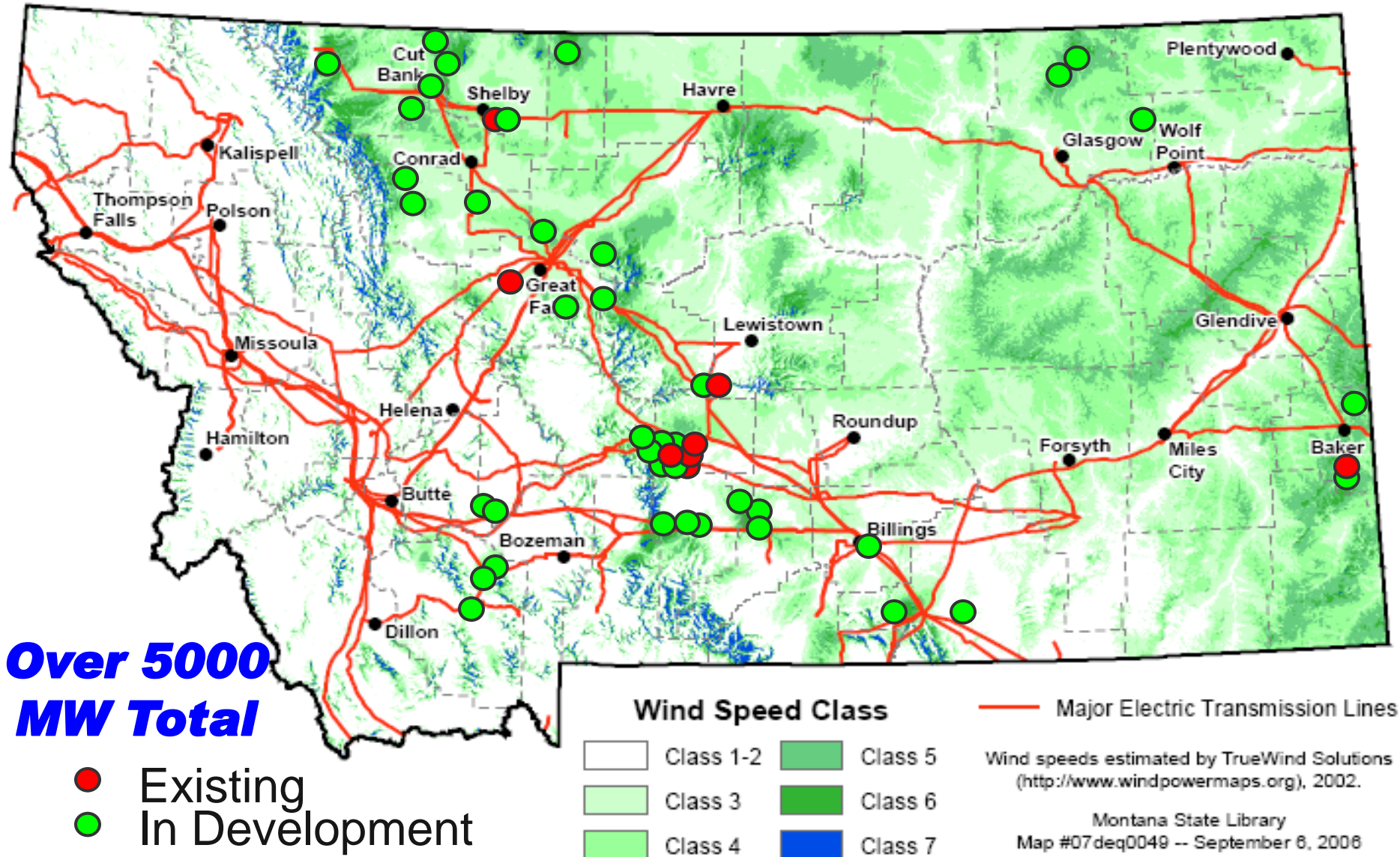
And many, many more...



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# Wind Projects in Various Levels of Development



# Montana Transmission for America

High-capacity,  
high-voltage  
interstate lines

Montana Alberta Tie  
Mountain States

Transmission Intertie

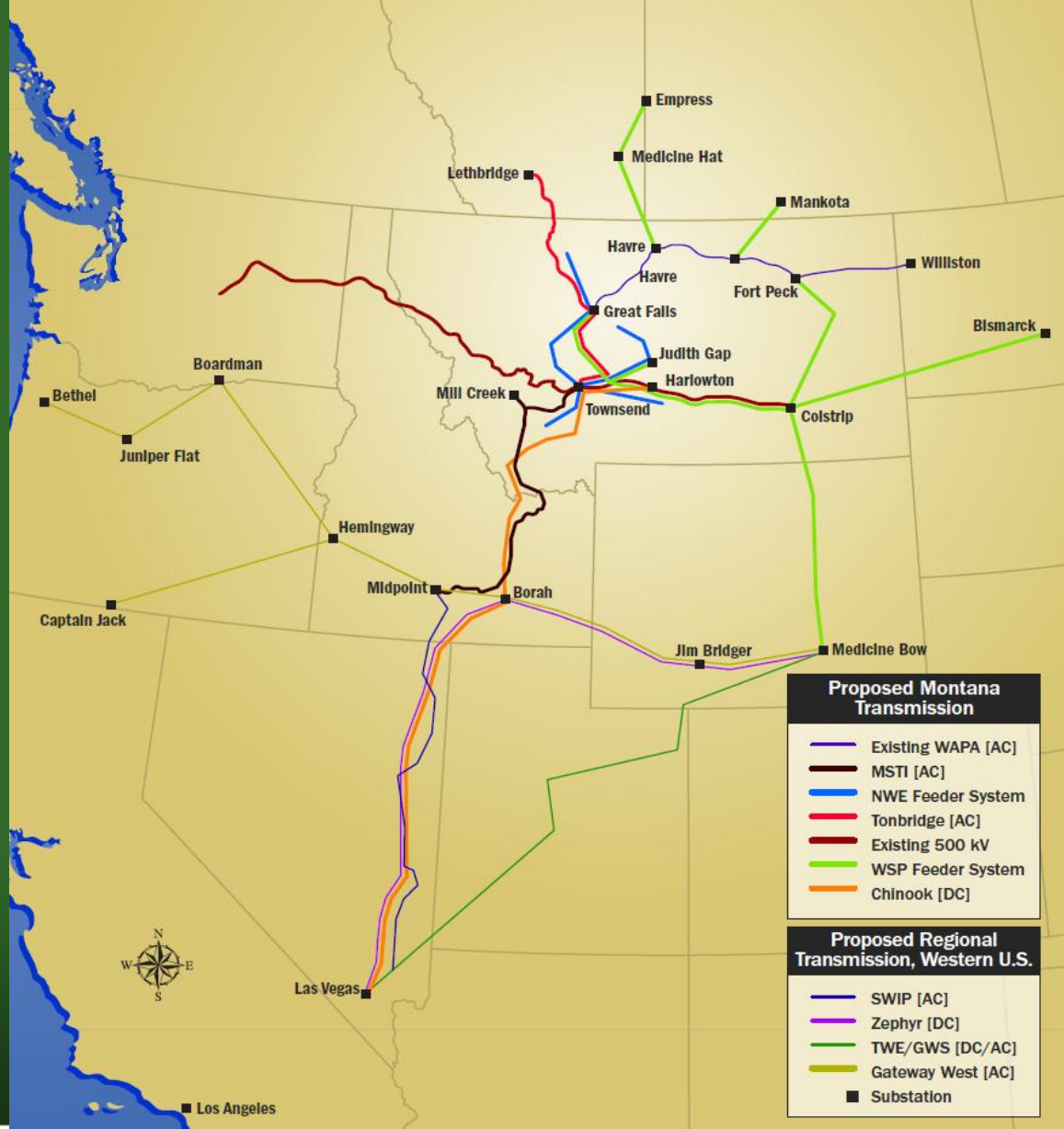
Chinook  
Wind Spirit

## Wind Collector Systems

NorthWestern Energy  
Wind Spirit



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- Montana is focusing on moving wind out of Montana providing additional transmission capacity in all directions (North, South, East and West)
- This will make regional power exchanges possible - improving the utilization of the transmission system and opening up a variety transactions



# Montana Alberta Tie, Ltd. (MATL)

- 600 MW (north and south)
- Great Falls, MT to Lethbridge, AB
- Fully financed and permitted
- Construction begins Fall 2009
- Operational by end of 2011



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# CHINOOK

- Harlowton, MT to Las Vegas, NV
- 3,000 MW, 500kV HVDC
- Operational early 2015
- Currently in permitting





# Mountain States Transmission Intertie (MSTI)

- 1,500 MW from Townsend, MT to Jerome, ID
- Final stages of permitting
- Open season spring 2010



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# WIND SPIRIT

- Collect at least 3,000 MW of wind to deliver a consistent 1,000 MW to load centers
- Collector System and Interstate lines



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# COLSTRIP UPGRADES

- Up to 700 MW of additional capacity on 500 kV system
- Initial studies completed
- In-service date: 2011



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# NorthWestern Energy Collector System

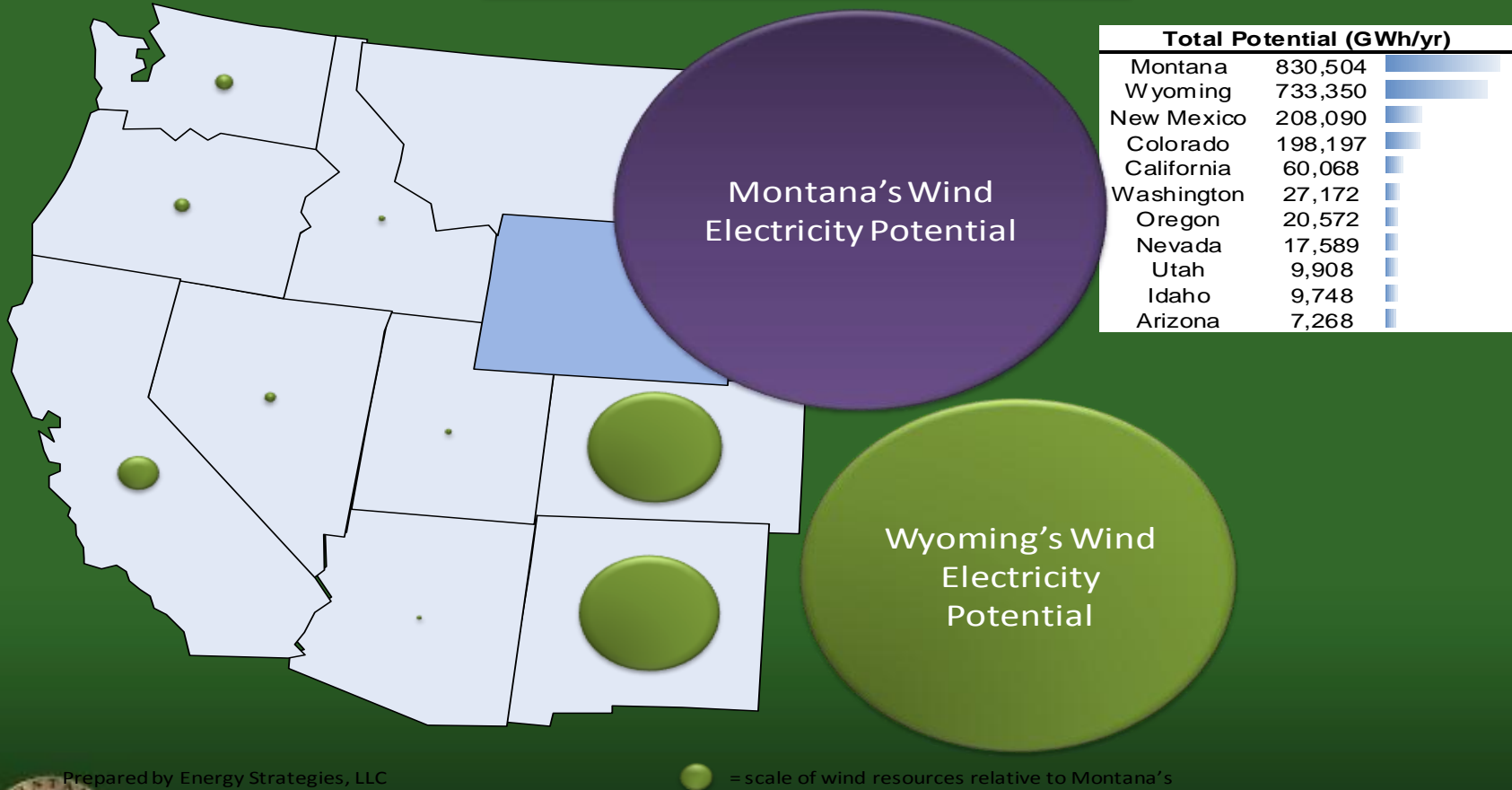
- Five collector lines from high wind areas to Townsend Substation
- Will connect to MSTI
- Open Season Spring 2010





# Western States Wind Energy Potential

Wind Electricity Potential  
(GWh/yr) Class 4-7



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of Economic Development**

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[www.business.mt.gov](http://www.business.mt.gov)

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